

Customer No. 000959

Case Docket No. FHW-037

01/26/99  
 09237466  
 01/26/99

jc135 U.S. PTO

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 09/237466  
 01/26/99

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Date of Deposit January 26, 1999

I hereby certify that this transmittal letter and the papers referred to as being enclosed therein are being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231.

Signature

**Ilidio P. Cardoso**

Please Print Name of Person Signing

Sir:

Transmitted herewith for filing is the patent application of

Inventor(s): **Derek Ian Joseph HOPKINS**

For: **ANALYSING TACTICAL DATA LINK MESSAGES**

Enclosed are:

- ☐ This is a request for filing a ☐ continuation ☐ divisional application under 37 CFR 1.53(b), of pending prior application serial no. \_\_\_\_\_ filed on \_\_\_\_\_ entitled \_\_\_\_\_.
- ☒ 9 pages of specification, 2 pages of claims, 1 pages of abstract.
- ☒ 3 sheets of drawings.
- ☒ An executed Declaration, Petition and Power of Attorney.
- ☐ An assignment of the invention to Stasys Limited will follow.
- ☒ A verified statement to establish small entity status under 37 C.F.R. 1.9 and 37 C.F.R. 1.27.
- ☒ Other Preliminary Amendment

The filing fee has been calculated as shown below:

	(Col. 1)	(Col. 2)
FOR:	NO. FILED	NO. EXTRA
BASIC FEE	////////////////////	
TOTAL CLAIMS	7 - 20	= 0
INDEP. CLAIMS	1 - 3	= 0
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIMS PRESENTED		

\* If the difference in Col. 2 is less than zero, enter "0" in Col. 2.

SMALL ENTITY	
RATE	FEE
////////	\$ 380
x 9=	\$ 0
x 39	\$ 0
+130	\$
TOTAL	\$380.00

OTHER THAN SMALL ENTITY	
RATE	FEE
////////	\$
x 18=	\$
x 78	\$
+260	\$
TOTAL	0

- ☐ Please charge my Deposit Account No. 12-0080 in the amount of \$ .  
 A duplicate copy of this sheet is enclosed.
- ☒ A check in the amount of **\$380.00** to cover the filing fee is enclosed.
- ☐ The Commissioner is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No. 12-0080.  
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- ☐ Any additional filing fees required under 37 C.F.R. 1.16.  
☐ Any patent application processing fees under 37 C.F.R. 1.17.

☒ The Commissioner is hereby authorized to charge payment of the following fees during the pendency of this application or credit any overpayment to Deposit Account No. 12-0080.  
A duplicate copy of this sheet is enclosed.

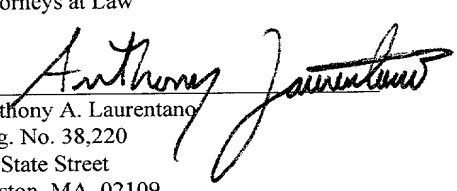
- ☐ Any patent application processing fees under 37 C.F.R. 1.17.  
☐ The issue fee set in 37 C.F.R. 1.18 at or before mailing of the Notice of Allowance, pursuant to 37 C.F.R. 1.311(b).  
☒ Any filing fees under 37 C.F.R. 1.16 for presentation of extra claims.

☒ Address all future communications (May only be completed by applicant, or attorney or agent of record) to Anthony A. Laurentano, Esq. at **Customer Number: 000959** whose address is:

Lahive & Cockfield, LLP  
28 State Street  
Boston, Massachusetts 02109

Date: January 26, 1999

LAHIVE & COCKFIELD, LLP  
Attorneys at Law

By   
Anthony A. Laurentano  
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VERIFIED STATEMENT CLAIMING SMALL ENTITY STATUS  
(37 CFR 1.9(f) & 1.27(c))--SMALL BUSINESS CONCERN

Docket Number (Optional)

FHW-037

Applicant or Patentee: HOPKINS, Derek Ian Joseph

Serial or Patent No.: \_\_\_\_\_

Filed or Issued: \_\_\_\_\_

Title: Analysing Tactical Data Link Messages

I hereby declare that I am

- ☐ the owner of the small business concern identified below:  
☒ an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF SMALL BUSINESS CONCERN Stasys Limited

ADDRESS OF SMALL BUSINESS CONCERN The Granary, 1 Waverley Lane, Farnham, Surrey GU9 8BB, GB  
R

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.12, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees to the United States Patent and Trademark Office, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention described in:

- ☒ the specification filed herewith with title as listed above.  
☐ the application identified above.  
☐ the patent identified above.

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights in the invention must file separate verified statements averring to their status as small entities, and no rights to the invention are held by any person, other than the inventor, who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person made the invention, or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d), or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization having any rights in the invention is listed below:

- ☒ no such person, concern, or organization exists.  
☐ each such person, concern or organization is listed below.

Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING Julian Ranger

TITLE OF PERSON IF OTHER THAN OWNER \_\_\_\_\_

ADDRESS OF PERSON SIGNING The Granary, 1 Waverley Lane, Farnham, Surrey RH9 8BB, GB

SIGNATURE \_\_\_\_\_

DATE

21 JANUARY 1999

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of: Derek Ian Joseph HOPKINS

Serial No.:

Filed: Herewith

For: ANALYSING TACTICAL DATA LINK  
MESSAGES

Attorney Docket No.: **FHW-037**

Group Art Unit:

Examiner:

Assistant Commissioner for Patents  
Washington, D.C. 20231

**PRELIMINARY AMENDMENT**

Dear Sir:

Preliminary to examination of the above-referenced patent application, please amend the application as follows.

**In the Claims:**

1. (Amended) A method of [analysing] analyzing data link messages, comprising the steps of:
  - a) receiving a plurality of data link messages;
  - b) assigning each data link message to one of a plurality of message groups such that each group contains data link messages of a specific message type;
  - c) within a group,
    - (i) tabulating the messages so as to align corresponding fields; and
    - (ii) displaying the tabulated data[.], and
  - (d) displaying a list of field contents for each field type, the list being filtered to remove repeated incidence of the same content.

2. (Amended) A method according to claim 1 further comprising the step of performing to all of said message groups the steps of tabulating the messages and displaying the tabulated data and the field contents [wherein the processing is applied to all groups].

3. (Amended) A method according to claim 1 further comprising the step of placing [wherein each group contains] all of said data link messages of a specific message type into each of said plurality of message groups.

4. (Amended) A method according to claim 1 further comprising the step of sorting said list of field contents [wherein the list is sorted].

5. (Amended) A method according to claim 1 further comprising the step of filtering one of said plurality of message groups [wherein the group is filtered] so as to display only messages having a particular content for that field type, the content having been selected from the list of field contents.

6. (Amended) A method according to claim 1 further comprising the step of filtering [wherein] the list [is filtered] to remove repeated incidence of content falling within a specified range.

7. (Amended) A method according to claim 1 [in which] wherein the data link messages [are] comprise tactical data link messages.

### **REMARKS**

Preliminary to examination of this application, please amend claims 1-7 to address minor formal matters, such as antecedent basis, and to conform the claims more appropriately to U.S. Patent Practice and Laws. Support for the claims can be found throughout the specification, Figures and claims as originally filed. The above amendments introduce no new matter.

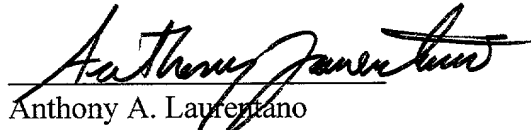
Entry of the foregoing Preliminary Amendment is accordingly in order and requested.

Re: Attorney Docket No. FHW-037

If there are any questions regarding the proposed amendments to the application, we invite the Examiner to call Applicant's representative at the telephone number below.

Respectfully submitted,

LAHIVE & COCKFIELD, LLP



Anthony A. Laurentano  
Registration No. 38,220  
Attorney for Applicants

28 State Street  
Boston, MA 02109  
(617) 227-7400

Date: January 26, 1999

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669210-9942260

## ANALYSING TACTICAL DATA LINK MESSAGES

### TECHNICAL FIELD OF THE INVENTION

The present invention relates to a method of analysing data link messages. It is particularly useful for detecting interoperability conflicts between the various sources of such messages. In this application, the description is directed to the interpretation of tactical data link messages, but the principle of the invention can be applied to like messages.

### BACKGROUND OF THE INVENTION

Tactical data links operate by exchanging messages between military units such as aircraft, ships, ground stations etc, which are synchronised in a radio network. Messages are transmitted in a digital form and consist of a stream of data bits formatted according to certain rules. These rules lay down that messages have a fixed format dependent on their message type. Different message types are intended to contain different information. For example, a track message will contain position and velocity information of (for example) an aircraft, whilst a status message will contain fuel data and weapons status of the aircraft. At present, approximately fifty different types of messages are defined for each link.

The message types and formats for each type are set down according to NATO rules and in theory a platform conforming to those rules should

therefore be able to communicate with any other platform which also follows those rules. In other words, the platforms are fully interoperable and can communicate with each other satisfactorily. In practice, the rules are inevitably insufficiently comprehensive to cover every eventuality. There is therefore scope for variation between different platform implementations, and these variations typically lead to interoperability problems. For example, a receiving platform may require that an incoming message contains certain information whereas the transmitting platform for some reason does not include that information. This would result in the receiving platform discarding that message as it did not meet its processing rules.

Interoperability problems such as this can be discovered by comparing the different platform implementations with reference to their build specifications. However, the specifications themselves may be unclear and the procedure would in any case be lengthy and difficult. It is more usual for interoperability problems to be discovered during a trial when the messages are recorded and their contents matched against expected events in each platform.

The difficulty with this latter approach is that data is generated by tactical data links at a very high rate. It is normal to generate approximately 20 MB of data during a two hour flight by a single platform. This can be compressed for transmission, but for analysis will obviously need to be decompressed. A lengthy trial with a significant number of platforms will clearly generate a prima facie unmanageable volume of data.

It is however essential that interoperability problems are identified in order to allow their resolution. Such difficulties could significantly impair the effectiveness of armed forces in a conflict situation, the implications of which are clear.

At present, data is sorted chronologically and placed into a database.



The sheer volume of data and the wide range of information that may be included within a specific message field due to the large number of message formats means that direct inspection of the data is not physically possible on any significant scale. However, databases allow a user to present queries, which are essentially filters to select those entries which meet certain criteria. Thus, a user can present the database with queries intended to illuminate interoperability conflicts.

The use of databases to analyse the data in this way has certain defects. It is immediately apparent to a user that the databases take a significant amount of time to analyse the data and respond to the query. Whilst this could in future be solved by applying ever greater processing power to the database, it would be useful to be able to accelerate the process. At present, the various stages necessary to convert the data into a form readable by the database, enter it into the database, select appropriate queries and obtain responses and analyse those responses means that, at best, results are available several days after the trial. It would be useful if those results were available at the post-trial debrief. As this is held a matter of hours after the trial end, whilst operators memories are still fresh, this is simply not practical at present.

Existing databases also suffer from a more fundamental flaw. It is up to the user to generate queries, and therefore this requires an a priori knowledge of the type of interoperability conflicts likely to arise. The user is not generally in a position to detect unexpected interoperability errors, as the raw data cannot feasibly be inspected and the processing time required rules out the use of a large number of speculative queries aimed at detecting unlikely or unsuspected conflicts. Speculative queries also require the user to have an intimate knowledge of the type of content in particular message fields, in order to detect unusual entries. This again cannot be guaranteed, and is clearly unlikely in the case of unsuspected conflicts.

## SUMMARY OF THE INVENTION

The present invention seeks to provide a more intuitive analysis method for data link messages which is capable of providing speedier analysis.

The present invention therefore provides a method of analysing data link messages, comprising the steps of:

- a) receiving a plurality of data link messages;
- b) assigning each data link message to one of a plurality of message groups such that each group contains data link messages of a specific message type;
- c) within a group,
  - (i) tabulating the messages so as to align corresponding fields;
  - (ii) displaying the tabulated data,
- (d) displaying a list of field contents for each field type, the list being filtered to remove repeated incidence of the same content.

Thus, the list simultaneously presents the user with a summary of the common entries for a particular field type and any spurious or unusual entries. For example, if an entry normally contained a number between 1 and 12, for example, this list would comprise a random scattering of numbers in this range. If it also included a value such as 87 or a text value then at least one platform within the trial is clearly transmitting an incompatible message. It is likely that that message has a different meaning or is for some reason erroneous. This type of analysis does not require the operator to be aware a priori of the likely message content.

The processing is preferably applied to all groups, but may be applied to a single group if it is known that this is the source of problems.

It will clearly be preferable for a group to contain all data link messages of a specific message type.

It is further preferred to allow the group to be filtered so as to display only messages having a particular content for that field type, the content having been selected from the list. This enables an immediate selection to be made of erroneous or unusual entries in the list, which will then highlight the message or messages containing that entry. This would then enable the user to identify the platform or platforms generating those messages and institute appropriate corrective action.

A small modification to the above which may on occasions be useful is for the lists to remove repeated incidence of content falling within a specified narrow range. This could be more useful for continuously variable data types. It could for example be applied to latitude or longitude data to identify messages being received from platforms in an incorrect theatre.

As mentioned above, it is particularly envisaged that the invention will be applied to tactical data link messages. However, the principle can be applied to other data links and the invention is not therefore limited in this respect.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the present invention will now be described by way of example, with reference to the accompanying Figures, in which:

Figure 1 shows the exchange of tactical data link messages;

Figure 2 shows the tactical data link messages arranged and displayed according to the present invention;

Figure 3 shows an arrangement similar to Figure 2 employing a commercially available programme; and

Figure 4 shows the data of Figure 3 being analysed.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

Tactical data links operate by exchanging messages between units (aircrafts, ships, ground stations) which are synchronised in a radio network. Several different links are implemented, and are known as Link x where x is a number, Link 11, Link 16 etc. The different links use different radio signals and different radio sets to transmit and receive information. The messages are transmitted in digital form, consisting of a stream of data bits formatted according to rules set out in the Link standard. For Links such as Link 16, the messages are transmitted at a high rate and contain information accurate to within a few seconds.

The messages are formatted as different types, each type having a fixed format and containing similar information. The different message types have completely different formats and contain different information. For example, the types may consist of a track message, which contains position and velocity of a track, and a status message which contains fuel and weapons status of an aircraft. Within the framework of Link 16, some 50 different types of message are defined.

Within the structure of Link 16, each platform is assigned time slots of 7.8 ms duration and transmits messages only in those slots (but not necessarily in all of them). Messages may be transmitted regularly at defined intervals, or as "one offs" resulting from some operator action. Messages can be one of about 50 different types, which correspond to different possibilities for information exchange. For Link 16, each message type has a unique designation as a two part number of the form x,y. Thus,

there are 256 different designations possible, of which approximately 50 are used, as mentioned above. Each message may contain between about 50 and 300 bits of information. The message is split into a number of fields which contain information relevant to the use of that particular message. For example, a track message will contain fields for latitude, longitude, speed, aircraft type etc. The representation of each field is fixed for a particular message type, so that a message can be decoded if the structure is known and the message type received. Some examples of messages are given below.

Number	Name	Use
J0.0	Initial Entry	Allows units to synchronise to the network
J2.2	Air PPLI	Transmitted by Link 16 equipped units to give precise positional and identification data
J3.2	Air Track	Transmitted by command and control units to disseminate track data on the network
J12.0	Mission Assignment	One-off message used to assign a tactical mission to a controlled unit
J13.0	Airfield Status	Gives weather and other information about airfields

By way of example, the list of fields for an Air PPLI message includes latitude, longitude, course, speed, height, relay status, airborne status, voice call sign and platform type.

All tactical data links and certain other types of data link such as buses that connect processors in some data processing systems have a similar message structure.

A recording of a tactical data link will contain all messages that have been transmitted by all units with a certain time frame. The recording contains message of different types, ordered chronologically. The analysis

tool must decode messages into fields and sort them. In the past, using text-based analysis tools, the messages have been sorted chronologically.

Figure 1 illustrates tactical data links in progress, transferring messages 16, 18, 20 to and from a ground station 10 and operating aircraft 12, 14.

Figure 2 shows the manner in which data is ordered and structured according to the present invention. Thus, messages are first sorted by message type and grouped accordingly. Within a message group, they can be sorted chronologically if desired. The messages are then tabulated such that each field is displayed in an aligned relationship to other fields.

Figure 3 shows the same data displayed by a commercially available programme, Microsoft Excel. Microsoft is a registered Trade Mark. Markers 50 indicate that a drop down menu can be selected, as shown in Figure 4, to reveal all the discrete values within that field. Anomalous values such as that illustrated at 52 are clearly highlighted. Selection of these values from the field results in the programme automatically applying a filter aimed at selecting that or those messages. These messages can then be inspected individually to trace the source platform.

It will be apparent that use of the analysis method set out above enables unusual or spurious entries to be detected very quickly. Messages such as the Air PPLI type include a total of forty fields, so it will therefore take only a matter of seconds to look through the individual filter results and identify spurious or unusual entries. The tabulated storage method is also very much less unwieldy than a database, and therefore can be filtered to reveal the erroneous message much more quickly. In tests, analysis results have been available in time for the post-exercise debrief, a matter of hours. This compares with the several days required to analyse the same data through the use of a database.

It will be appreciated that many variations could be made to the above described example without departing from the scope of the present invention.

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WHAT IS CLAIMED IS:

1. A method of analysing data link messages, comprising the steps of:
  - a) receiving a plurality of data link messages;
  - b) assigning each data link message to one of a plurality of message groups such that each group contains data link messages of a specific message type;
  - c) within a group,
    - (i) tabulating the messages so as to align corresponding fields;
    - (ii) displaying the tabulated data.
  - (d) displaying a list of field contents for each field type, the list being filtered to remove repeated incidence of the same content.
2. A method according to claim 1 wherein the processing is applied to all groups.
3. A method according to claim 1 wherein each group contains all data link messages of a specific message type.
4. A method according to claim 1 wherein the list is sorted.
5. A method according to claim 1 wherein the group is filtered so as to display only messages having a particular content for that field type, the content having been selected from the list.
6. A method according to claim 1 wherein the list is filtered to remove repeated incidence of content falling within a specified range.
7. A method according to claim 1 in which the data link messages are



tactical data link messages.

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ABSTRACTANALYSING TACTICAL DATA LINK MESSAGES

The application describes a method of analysing data link messages, comprising the steps of:

- a) receiving a plurality of data link messages;
- b) assigning each data link message to one of a plurality of message groups such that each group contains data link messages of a specific message type;
- c) within a group,
  - (i) tabulating the messages so as to align corresponding fields;
  - (ii) displaying the tabulated data.
- (d) displaying a list of field contents for each field type, the list being filtered to remove repeated incidence of the same content.

For each field type, it is preferred to display a list of field contents within that type, filtered to remove repeated incidence of the same content. Thus, the user is presented simultaneously with a summary of the common entries for a particular field type and any spurious or unusual entries. It is also useful to filter the lists to remove repeated incidence of content falling within a specified narrow range. This could be more useful for continuously variable data types such as latitude or longitude data. This is particularly applicable to tactical data link messages.

[illegible]

Fig 2

Microsoft Excel - AIRDATA.XLS														
File Edit View Insert Format Tools Data Window Help														
15 TX01														
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Air PPL														
1	2	Time	Latitude	Longitude	Course	Speed	Height	Relay	Status	Airborne	Sign	Voice Call	Platform	
4														
5		13:28:25	51.259	-0.707	25	515	12015	Inactive		Airborne	TX01		F-16	
6		13:28:37	51.27456	-0.69547	25	519	12020	Inactive		Airborne	TX01		F-16	
7		13:28:49	51.29024	-0.68385	25	502	12057	Inactive		Airborne	TX01		F-16	
8		13:29:01	51.30595	-0.67221	25	522	12103	Inactive		Airborne	TX01		F-16	
9		13:29:13	51.32172	-0.6053	26	522	12116	Inactive		Airborne	TX01		F-16	
10		13:29:25	51.33736	-0.64841	30	524	12161	Inactive		Airborne	TX01		F-16	
11		13:29:37	51.35248	-0.63453	31	526	12210	Inactive		Airborne	TX01		F-16	
12		13:29:49	51.36751	-0.62018	31	529	12223	Inactive		Airborne	TX01		F-16	
J2.2 / 123 / 189 /														

Fig 3

50

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Microsoft Excel - AIRDATA.XLS												
File Edit View Insert Format Tools Data Window Help												
15 TX01												
A	B	C	D	E	F	G	H	I	J			
Air PPL												
1	Time	Latitude	Longitude	Course	Speed	Height	Relay	Status	Airborne	Voice Call	Platform	
2												
3												
4												
5	13:28:25	51.259	-0.707	25	515	12015	Inactive	Airborne	TX01 (All)			
6	13:28:37	51.27456	-0.69547	25	519	12020	Inactive	Airborne	TX01 (Custom...)			
7	13:28:49	51.29024	-0.68385	25	502	12057	Inactive	Airborne	TX01 Tornado			
8	13:29:01	51.30595	-0.67221	25	522	12103	Inactive	Airborne	TX01 (Blanks)			
9	13:29:13	51.32172	-0.6053	26	522	12116	Inactive	Airborne	TX01 (NonBlanks)			
10	13:29:25	51.33736	-0.64841	30	524	12161	Inactive	Airborne	TX01 F-16			
11	13:29:37	51.35248	-0.63453	31	526	12210	Inactive	Airborne	TX01 F-16			
12	13:29:49	51.36751	-0.62018	31	529	12223	Inactive	Airborne	TX01 F-16			

Fig 4

52

09237466.012699

Customer Number: 000959

Attorney's  
Docket  
Number FHW-037

Declaration, Petition and Power of Attorney For Patent Application

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

ANALYSING TACTICAL DATA LINK MESSAGES

the specification of which

(check one)

X is attached hereto.

   was filed on                                  as

Application Serial No.                                 

and was amended on                                   
(if applicable)

I do not know and do not believe that the subject matter of this application was ever known or used in the United States before my invention thereof or patented or described in any printed publication in any country before my invention thereof or more than one year prior to the date of this application, and that said subject matter has not been patented or made the subject of an issued inventor's certificate in any country foreign to the United States on an application filed by me or my legal representatives or assigns more than twelve months prior to the date of this application; that I acknowledge my duty to disclose information of which I am aware which is material to the examination of this application, that no application for patent or inventor's certificate on the subject matter of this application has been filed by me or my representatives or assigns in any country foreign to the United States, except those identified below, and that I have reviewed and understand the contents of the specification, including the claims as amended by any amendment referred to herein.

I acknowledge the duty to disclose to the Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

09237466-042699

# PRIORITY CLAIM

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed.

Check one:

☐ no such applications have been filed.

☒ such applications have been filed as follows

EARLIEST FOREIGN APPLICATION(S), IF ANY FILED WITHIN 12 MONTHS  
(6 MONTHS FOR DESIGN) PRIOR TO THIS U.S. APPLICATION

Country	Application Number	Date of Filing (month,day,year)	Priority Claimed Under 35 USC 119
GB	9801669.4	January 27, 1998	X Yes No _
			_ Yes No _
			_ Yes No _
			_ Yes No _
			_ Yes No _

ALL FOREIGN APPLICATION(S), IF ANY FILED MORE THAN 12 MONTHS  
(6 MONTHS FOR DESIGN) PRIOR TO THIS U.S. APPLICATION


CLAIM FOR BENEFIT OF U.S. PROVISIONAL APPLICATION(S)

I hereby claim the benefit under 35 U.S.C. §119(e) of any United States provisional application(s) listed below.

\_\_\_\_\_  
(Application Serial No.)

\_\_\_\_\_  
(Filing Date)

\_\_\_\_\_  
(Application Serial No.)

\_\_\_\_\_  
(Filing Date)



# CLAIM FOR BENEFIT OF EARLIER U.S./PCT APPLICATION(S)

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose to the Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application. As to subject matter of this application which is common to my earlier United States application, if any, described below, I do not believe that the same was ever known or used in the United States before my invention thereof or patented or described in any printed publication in any country before my invention thereof or more than one year prior to said earlier application, or in public use or on sale in the United States more than one year prior to said earlier application, that the said common subject matter has not been patented or made the subject of an inventor's certificate issued before the date of said earlier application in any country foreign to the United States on an application, filed by me or my legal representatives or assigns more than twelve months prior to said application and that no application for patent or inventor's certificate on said subject matter has been filed by me or my representatives or assigns in any country foreign to the United States except those identified herein.

<u>(Application Serial No.)</u>	<u>(Filing Date)</u>	<u>(Status)</u> (patented,pending,aband.)
<u>(Application Serial No.)</u>	<u>(Filing Date)</u>	<u>(Status)</u> (patented,pending,aband.)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorneys and/or agents to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

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Wherefore I petition that letters patent be granted to me for the invention or discovery described and claimed in the attached specification and claims, and hereby subscribe my name to said specification and claims and to the foregoing declaration, power of attorney, and this petition.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor	Derek Ian Joseph HOPKINS	
Inventor's signature	<i>D I Hopkins</i>	Date <i>21st January 1999</i>
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